

REMARKS/ARGUMENTS

Amendments to the Claims

Claim 21 has been amended to include the matter of claim 26 and to correct some errors in the grammar of the claim. Claim 26 has been canceled. Claim 23 has been amended to change the lettering of the steps as a result to the amendment to claim 21. Claim 27 has been amended to refer to claims 21 through 25 rather than 21 through 26.

Elections/Restrictions

The Office Action classifies the pending claims into two groups and states that the groups do not relate to a single general inventive concept under PCT Rule 13.2. The Office Action further notes that a provisional election was made with traverse to prosecute the inventions of Group I which includes claims 21 to 26. The Applicants confirm this election but wish to argue their traverse against the withdrawal of claims 27 to 32.

PCT Rule 13.2 states that the requirement of unity of invention referred to in Rule 13.1 is fulfilled when there is a technical relationship among the claims involving one or more special technical features. The expression "special technical features" is defined in Rule 13.2 as meaning technical features that define a contribution which each of the claimed inventions makes over the prior art. The Applicants submit that claim 21 recites a set of elements which define a contribution over the prior art. All of claims 22 to 25 include the elements of claim 21 by their dependence on claim 21. Claim 27 also incorporates all of the elements of claim 21 because it is dependent on any of claims 21 through 25 by virtue of step (a) of claim 27. All of claims 28 to 32 are dependent on claim 27 and therefore also include all of the elements of claim 21. Accordingly, every claim in the application includes the set of elements of claim 21 and therefore each claim has at least one special technical feature in common. The Applicants submit that Rule 13.2 is

satisfied and respectfully request that the withdrawal of claims 27 to 32 from further consideration be reversed.

Claim Rejections – 35 U.S.C. 112

Claims 21 and 26 were rejected under 35 U.S.C. 112 for being indefinite due to claim 21 terminating without a period. Claim 21 has been amended to incorporate the matter of claim 26 and to correct its grammatical errors. Claim 26 has been canceled. The Applicants submit that the claims as amended are not indefinite.

Claim Rejections – 35 U.S.C. 103

The Office Action rejected claims 21, 22, 25 and 26 as being obvious in view of Zha et al. US 6,156,200 (US '200). The Applicants respectfully traverse this rejection for the following reasons.

Part (g) of claim 21 states that the one or more modules have a surface area of at least 500 m² for every square meter of horizontal cross-sectional area of the tank. Accordingly, to relate to part (g) of claim 21, a reference must describe both the aggregate surface area of the one or more modules located in a particular tank, disclose the horizontal cross-sectional area of that tank and the ratio of the surface area of the modules must be at least 500 m² for every square meter of horizontal cross-sectional area of the tank. This relationship of the aggregate surface area of the modules in a tank to the horizontal cross-sectional area of the tank effects various flow characteristics in the tank and mass balances in a process running in the tank. For example, the application at page 8, lines 20-23, notes that the tank velocity is related to the matter of part (g) of claim 21.

Reference US '200 fails to provide sufficient information to make claim 21 obvious. As noted in the Office Action, US '200 fails to disclose the membrane surface area. In addition, US '200 fails to disclose the horizontal cross-sectional area of any tank holding

any particular number of modules. Having failed to disclose both the surface area of the modules and the horizontal cross-sectional area of a tank holding the modules, US '200 cannot disclose any relationship between the surface area of the modules in a tank and the horizontal cross-sectional area of the tank.

The Office Action notes that US '200 recites a very tightly packed module containing 11,000 fibers. The diameter or length of these fibers is not specified and so the surface area of this module cannot be determined. The size of a tank that could hold such a module is not described. The Office Action states that it would be obvious to one skilled in the art to use a large number of these modules in order to reach a predetermined membrane surface area in the tank. However, a person skilled in the art increasing the number of modules to produce a larger amount of permeate conventionally increases the size of the tank that the modules are located in. Accordingly, the suggestion that people skilled in the art could choose to increase the surface area of their modules to achieve a desired permeate flow does not mean that they would increase the surface area of their modules relative to the horizontal cross-sectional area of the tank. Further, element (g) of claim 21 is not dependent on having a large membrane surface area. Part (g) of claim 21 could be met by a very small module located in a very small tank. US '200 simply fails to describe any relationship between module surface area and horizontal cross-sectional area of the tank and so cannot make claim 21 obvious.

Claim 22 depends on claim 21 and is not made obvious for at least the reasons given above. In addition, claim 21 states that the one or more modules cover more than 90% of the horizontal cross-sectional area of the tank. US '200 does not have anything in its text that relates to the element added in claim 22. The only relevant disclosure appears in Figure 5 which shows a cylindrical module covering only about 55% of the width of the tank, as determined by measuring the width of the header and the tank in Figure 5. Considering that this module is cylindrical, and that similar amounts of space are likely provided around all sides of the module, the module probably does not cover even one

half of the horizontal cross-sectional area of the tank. The module in Figure 5 also has a solid lower header. If this module were expanded to cover 90% of the horizontal cross-sectional area of the tank, its lower header would provide almost no room for vertical flow through the tank.

Claim 25 also depends on claim 21 and is not made obvious at least for the reasons given in relation to claim 21.

Claims 23 and 24 were rejected as being obvious over US '200 as applied to claims 21, 22 and 25 further in view of Miyashita et al. US 6,511,602 (US '602), Cote et al. US 5,248,424 (US '424) or JP 11165200 (JP '5200). For the reasons above, the Applicants submit that US '200 does not apply to claim 21 and is counter to claim 22. Further, claim 23 states that the modules are divided into elements, each element having a pair of opposed headers, the elements separated from each other by impervious plates and channels are provided for water to flow vertically through the elements. Claim 24 depends on claim 23 and additionally states that the elements have hollow fiber membranes oriented generally horizontally. These additional features are not provided by the additional citations.

Regarding reference US '602, the Office Action States that this reference discloses hollow fiber membranes disposed horizontally with a packing density of $500 \text{ m}^2 \text{ per m}^3$. This parameter is not the same as the parameter recited in part (g) of claim 21. Part (g) of claim 21 relates the surface area of the membranes to the horizontal cross-sectional area of the tank. The reference in US '602 relates the surface area of the membranes to the volume of the membrane modules. US '602 does not include any statement of what an appropriate horizontal cross-sectional area for a tank would be for its modules. Without some statement indicating what volume of membrane modules would be provided per square meter of horizontal cross-sectional area of a tank, US '602 does not provide information making part (g) of claim 21 obvious. Further, referring to figures 1,

4, 5 and 6 of US '602, significant amounts of space are provided on at least two sides of the module and may also be provided on the other two sides of the module. The other two sides of the module would only be visible if there were a plan view of the reactor in US '602, but there is none. Accordingly, the Applicants submit that US '602 does not provide any information which would make part (g) of claim 21 obvious. The Office Action also referred to Figure 3 of US '602 as relating to claim 23. Figure 3 of US '602 shows headers of a module but no impervious plates. Figure 2 of US '602 shows a notional perimeter around a collection of elements but not a physical structure (see column 4, lines 11-20 of JP '602). Column 4, lines 8-11 of JP '602 suggests that a casing may be present but does not state that the elements would be separated from each other by impervious plates and so all of the elements of claim 23 are not provided.

Regarding US '424, the Office Action states that figures 9 and 10 show modules covering more than 90% of the width of a tank. Claim 22, however, refers to modules which cover more than 90% of the cross-sectional area of the tank. The width of the tank is only one aspect of the cross-sectional area of a tank. The area is shown only in a figure giving a plan view. Referring to column 14, lines 48-68, of US '424, only Figure 9A is a plan view. From Figure 9A, it is clear that the module does not cover 90% of the horizontal cross-sectional area of the tank. Figure 9 is the corresponding elevation view that goes with Figure 9A. Figure 10 is an elevation view of another embodiment but there is no corresponding plan view. Without a plan view, Figure 10 does not disclose modules covering more than 90% of the horizontal cross-sectional area of a tank. Further, given the relationship between figures 9A and 9, a person reading US '424 would likely assume that a plan view corresponding to Figure 10 is likely similar to that shown in Figure 9A and so the modules would not cover 90% of the horizontal cross-sectional area of the tank. Further, the Office Action has not pointed to any part of US '424 that discloses the elements in claim 23.

Regarding JP '5200, the Office Action states that JP '5200 teaches horizontal membranes and a solid discharge at the top for recirculation purposes. A full copy of this reference and a machine translation are filed with this response. The Applicants submit, however, that solids are supplied to the top of the tank from sludge storage tank 48 and that sludge discharge actually occurs from the bottom of the tank. JP '5200 also does not provide any disclosure relating to part (g) of claim 21, claim 22 or the elements of claim 23.

For the reasons given above, the Applicants submit that the claims are not obvious in view of the cited references. The Applicants respectfully submit that all pending claims are allowable and request that a Notice of Allowance be issued.

Respectfully submitted,

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